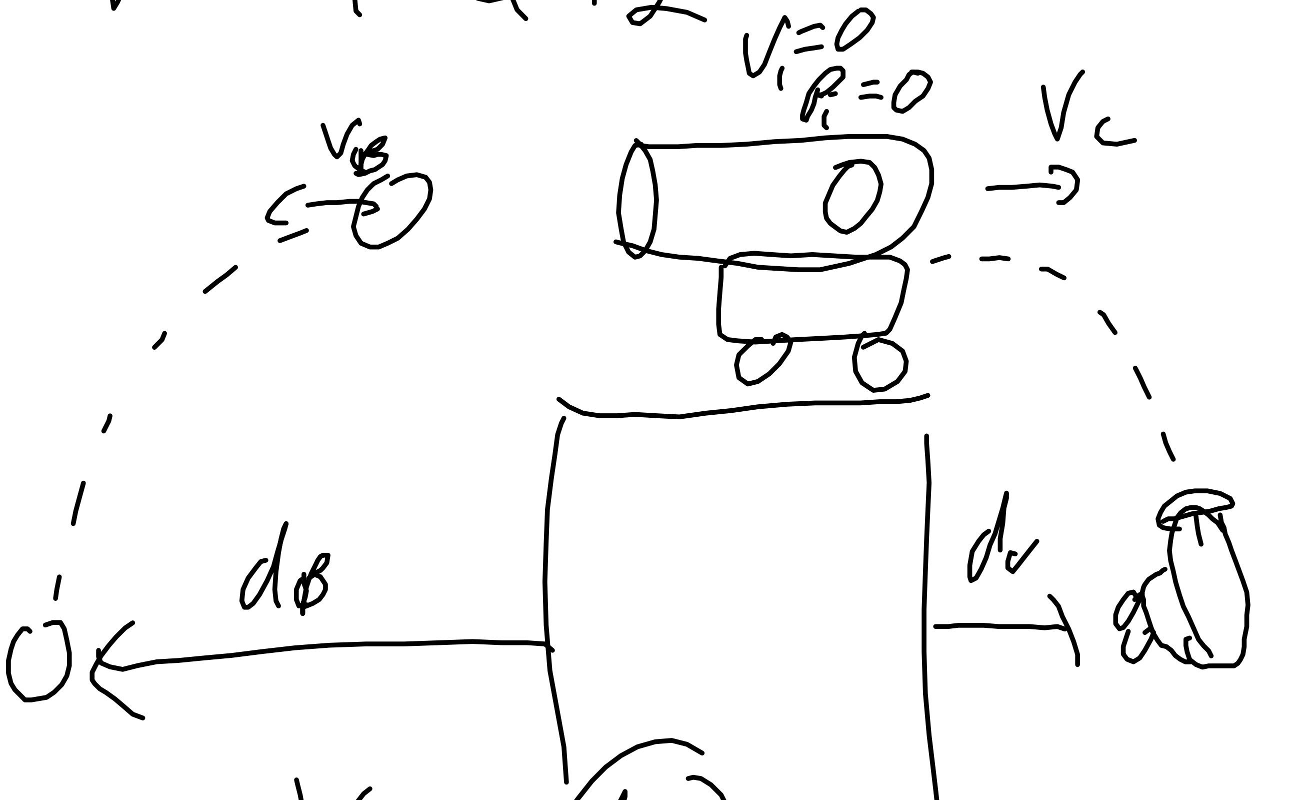
P189 Q12



$$\frac{V_B}{V_C} = \frac{d_B}{d_C}$$

$$\Sigma P_i = \Sigma P_f$$

$$0 = P_B + P_C$$

$$0 = m_B V_B + m_C V_C$$

$$m_B V_B = -m_C V_C$$

$$\frac{V_B}{V_C} = \frac{-m_C}{m_B} = \frac{d_B}{d_C}$$

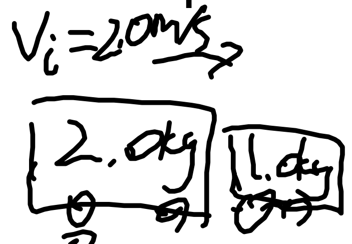
$$d_c = -\frac{d_B m_B}{m_c}$$

$$d_c = -\frac{215\text{m}(4.5\text{kg})}{225\text{kg}}$$

$$\boxed{d_c = -4.3\text{m}}$$

eg. A 2.0 kg cart collides with a 1.0 kg cart.

a) if the 2.0 kg cart is moving at 2.0 m/s before the collision and the carts stick together after the collision, what is the velocity of the two carts? What is the impulse on the 2.0 kg cart?

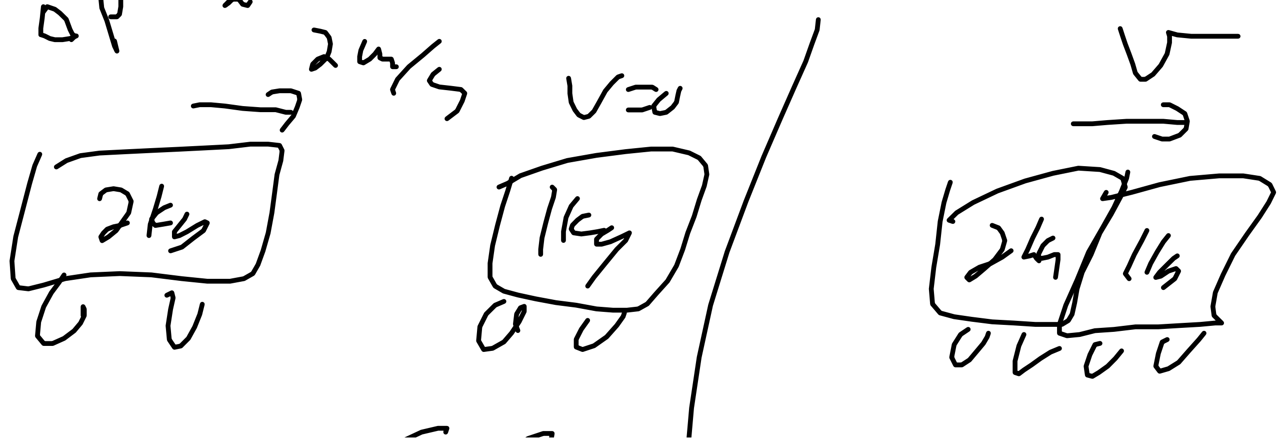


$p = mv$

$\Delta p = p_f - p_i$

$\Delta p = mv_f - mv_i$

$\Delta p = 2.0v_f - 2.0$



$$\Sigma P_i = \Sigma P_f$$

$$2\,kg \times 2\,m/s + 0 = (2\,kg + 1\,kg)\,v$$

$$4.0\,kg\,m/s = 3.0\,kg\,v$$

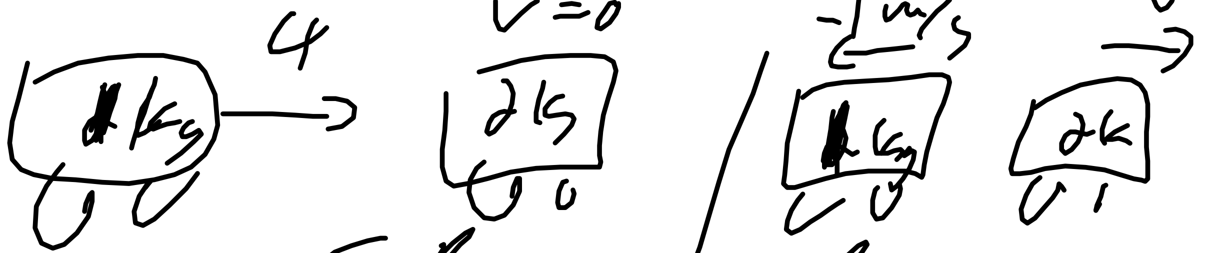
$$1.3\,m/s = v$$

$$\Delta p\ 1\,kg\ cart = P_f - P_i = 1.3\,kg\,m/s - 0 = 1.3\,kg\,m/s$$

$$\Delta p\ 2\,kg\ cart = P_f - P_i = 2\,kg(1.3\,m/s) - 4\,kg\,m/s$$ (1.3333)

$$= -1.3\,kg\,m/s$$

b) If the 1.0 kg cart was moving at 4.0 m/s, hits the 2.0 kg cart at rest and the 1.0kg cart bounces back at 1.0 m/s, what is the speed of the 2.0 kg cart? What is the impulse on the 2.0 kg cart?



$$\Sigma P_i = \Sigma P_f$$

$$4\,kg\,m/s + 0 = -1\,kg\,m/s + 2\,kg\,v$$

$$v = 2.5\,m/s$$

a) You push the two carts together with a spring between them, and let go. What is the velocity of the 2.0 kg cart if the 1.0 kg cart goes off at 3.0 m/s?

v= -1.5m/s momentum is conserved, initial momentum of the system is 0, so momentum of the two carts are equal and opposite

Δp = pf - pi = -3.0kgm/s - 0

a) write a paragraph about the physics of driving on snow/ice.

p185-189 Q5-12

p194 Q15, 25, 26

Physics of driving in the snow/ice

decrease the friction for the tires and reduce their ability to speed up or slow down.

friction is caused by microscopic bumps in the materials. Ice is smoother so it has less microscopic bumps and pressure melts the ice and the water layer between the tire and ice is very smooth.

Static friction is greater than kinetic friction because in static friction the bumps lock together but in kinetic friction the bumps skip along and have lower friction - think cross country skiing.

Why should you never spin your tires or lock your tires? Ease on the accelerator and ease on the brake so that you always have static friction instead of kinetic friction. Sliding/spinning melts the snow/ice - creating more ice.

Leave space for lower acceleration F=ma so lower a = lower force.

going up a hill, speed up before hand and user your momentum.
https://www.youtube.com/watch?v=7DfgfEGYeO8
increase the mass of your car, to increase the normal force - bags of salt or sand, friends,

ease the accelerator and rock the car over icy sections